

AMENDMENT TO THE CLAIMS

1. *(Currently Amended)* A method of operating an internal combustion engine comprising the steps of: (1) supplying a fuel composition to an engine wherein said fuel composition comprises a fuel, and an additive composition, comprising:

a Mannich reaction product of

- a) a polyisobutylene alkylated hydroxyaromatic compound;
- b) an aldehyde; and
- c) an amine containing at least one reactive amino group,

wherein the said polyisobutylene alkylated hydroxyaromatic compound is derived from a combination of a conventional polyisobutylene and a high vinylidene polyisobutylene; and wherein the said polyisobutylene alkylated hydroxyaromatic compound is derived by:

- i) combining the conventional polyisobutylene and the high vinylidene polyisobutylene prior to the alkylation of the hydroxyaromatic compound; or
- ii) combining a hydroxyaromatic compound alkylated with the conventional polyisobutylene and a hydroxyaromatic compound alkylated with the high vinylidene polyisobutylene.

2. *(Currently Amended)* The method ~~additive composition~~ of claim 1 wherein the conventional polyisobutylene has a trisubstituted double bond isomer content of 45 mole % or greater.

3. *(Currently Amended)* The method ~~additive composition~~ of claim 1 wherein the high vinylidene polyisobutylene has a combined alpha- and beta-vinylidene double bond isomer content of 70 mole % or greater.

4. *(Currently Amended)* The method ~~additive composition~~ of claim 1 wherein the polyisobutylene of the alkylated hydroxyaromatic compound has an alpha- and beta-vinylidene double bond isomer content of 50 to 95 mole % and a trisubstituted double bond isomer content of 4 to 40 mole %.

5. *(Currently Amended)* The method ~~additive composition~~ of claim 1 wherein the said polyisobutylene is derived by combining the conventional polyisobutylene and the high vinylidene polyisobutylene prior to the alkylation of the hydroxyaromatic compound.
6. *(Currently Amended)* The method ~~additive composition~~ of claim 1 wherein the said polyisobutylene is derived by combining a hydroxyaromatic compound alkylated with the conventional polyisobutylene and a hydroxyaromatic compound alkylated with the high vinylidene polyisobutylene.
7. *(Currently Amended)* The method ~~additive composition~~ of claim 1 wherein the said polyisobutylene is derived by combining a Mannich reaction product from a hydroxyaromatic compound alkylated with the conventional polyisobutylene and a Mannich reaction product from a hydroxyaromatic compound alkylated with the high vinylidene polyisobutylene.
8. *(Currently Amended)* The method ~~additive composition~~ of claim 1 wherein the said polyisobutylene has a number average molecular weight ranging from 500 to 3,000.
9. *(Currently Amended)* The method ~~additive composition~~ of claim 1 wherein the hydroxyaromatic compound is phenol, the aldehyde is formaldehyde or a reactive equivalent thereof, and the amine is a secondary monoamine, an alkylenediamine, or a mixture thereof.
10. – 13. *(Cancelled)*
14. – 16. *(Cancelled)*
17. *(Currently Amended)* The method ~~composition~~ of claim 1 wherein the weight ratio of conventional PIB to high vinylidene PIB is from 15:85 to 60:40.
18. – 19. *(Cancelled)*

20. (New) The method of claim 1 wherein said conventional polyisobutylene is derived from a process that uses an AlCl_3 catalyst and wherein said conventional polyisobutylene has an alpha- and/or beta-vinylidene double bond isomer content of 30 mole percent or less; and

wherein said high vinylidene polyisobutylene is derived from a process that uses a BF_3 catalyst and wherein said high vinylidene polyisobutylene has an alpha- and/or beta-vinylidene double bond isomer content of 80 mole percent or more.

21. (New) The method of claim 1 wherein the ratio of conventional polyisobutylene to high vinylidene polyisobutylene is from 10:90 to 40:60 on a weight basis and wherein the Mannich additive is present in the fuel composition from 10 to 1,000 ppm.

22. (New) The method of claim 20 wherein the ratio of conventional polyisobutylene to high vinylidene polyisobutylene is from 10:90 to 40:60 on a weight basis and wherein the Mannich additive is present in the fuel composition from 10 to 1,000 ppm.

23. (New) The method of claim 20 wherein the amine comprises a secondary monoamine containing from 0 to 22 carbon atoms, an alkylenediamine containing more than 2 carbon atoms, or a mixture thereof; and wherein the aldehyde comprises a aliphatic aldehyde.

24. (New) The method of claim 21 wherein the amine comprises a secondary monoamine containing from 0 to 22 carbon atoms, an alkylenediamine containing more than 2 carbon atoms, or a mixture thereof; and wherein the aldehyde comprises a aliphatic aldehyde.

25. (New) The method of claim 22 wherein the amine comprises a secondary monoamine containing from 0 to 22 carbon atoms, an alkylenediamine containing more than 2 carbon atoms, or a mixture thereof; and wherein the aldehyde comprises a aliphatic aldehyde.

26. (New) A method of preparing a Mannich additive comprising the steps of:

(1) reacting

- a) a polyisobutylene alkylated hydroxyaromatic compound;
- b) an aldehyde; and
- c) an amine containing at least one reactive amino group,

wherein the said polyisobutylene alkylated hydroxyaromatic compound is derived from a combination of a conventional polyisobutylene and a high vinylidene polyisobutylene; and wherein the said polyisobutylene alkylated hydroxyaromatic compound is derived by:

- i) combining the conventional polyisobutylene and the high vinylidene polyisobutylene prior to the alkylation of the hydroxyaromatic compound; or
- ii) combining a hydroxyaromatic compound alkylated with the conventional polyisobutylene and a hydroxyaromatic compound alkylated with the high vinylidene polyisobutylene.

27. (New) The method of claim 26 wherein said conventional polyisobutylene is derived from a process that uses an AlCl_3 catalyst and wherein said conventional polyisobutylene has an alpha- and/or beta-vinylidene double bond isomer content of 30 mole percent or less; and

wherein said high vinylidene polyisobutylene is derived from a process that uses a BF_3 catalyst and wherein said high vinylidene polyisobutylene has an alpha- and/or beta-vinylidene double bond isomer content of 80 mole percent or more.

28. (New) The method of claim 26 wherein the ratio of conventional polyisobutylene to high vinylidene polyisobutylene is from 10:90 to 40:60 on a weight basis and wherein the Mannich additive is present in the fuel composition from 10 to 1,000 ppm.

29. (New) The method of claim 27 wherein the ratio of conventional polyisobutylene to high vinylidene polyisobutylene is from 10:90 to 40:60 on a weight basis and wherein the Mannich additive is present in the fuel composition from 10 to 1,000 ppm.

30. (*New*) The method of claim 27 wherein the amine comprises a secondary monoamine containing from 0 to 22 carbon atoms, an alkylenediamine containing more than 2 carbon atoms, or a mixture thereof; and wherein the aldehyde comprises a aliphatic aldehyde.

31. (*New*) The method of claim 28 wherein the amine comprises a secondary monoamine containing from 0 to 22 carbon atoms, an alkylenediamine containing more than 2 carbon atoms, or a mixture thereof; and wherein the aldehyde comprises a aliphatic aldehyde.

32. (*New*) The method of claim 29 wherein the amine comprises a secondary monoamine containing from 0 to 22 carbon atoms, an alkylenediamine containing more than 2 carbon atoms, or a mixture thereof; and wherein the aldehyde comprises a aliphatic aldehyde.